TR-20
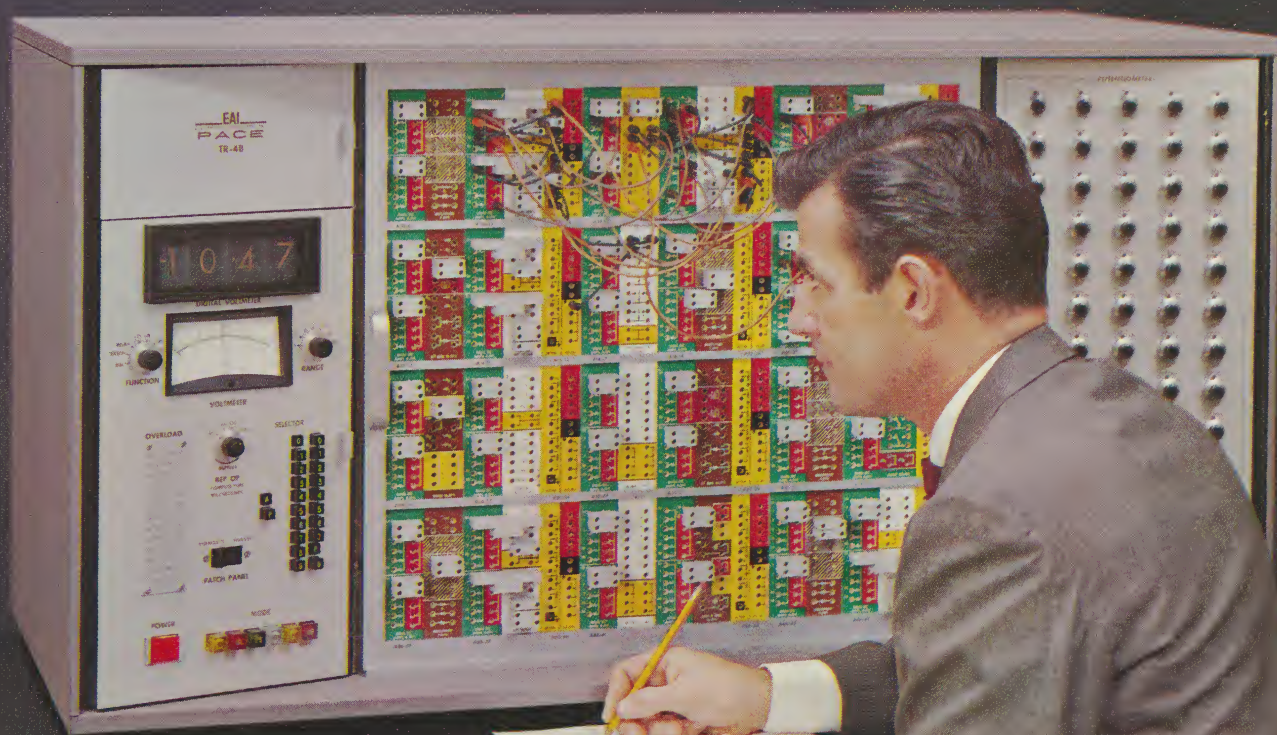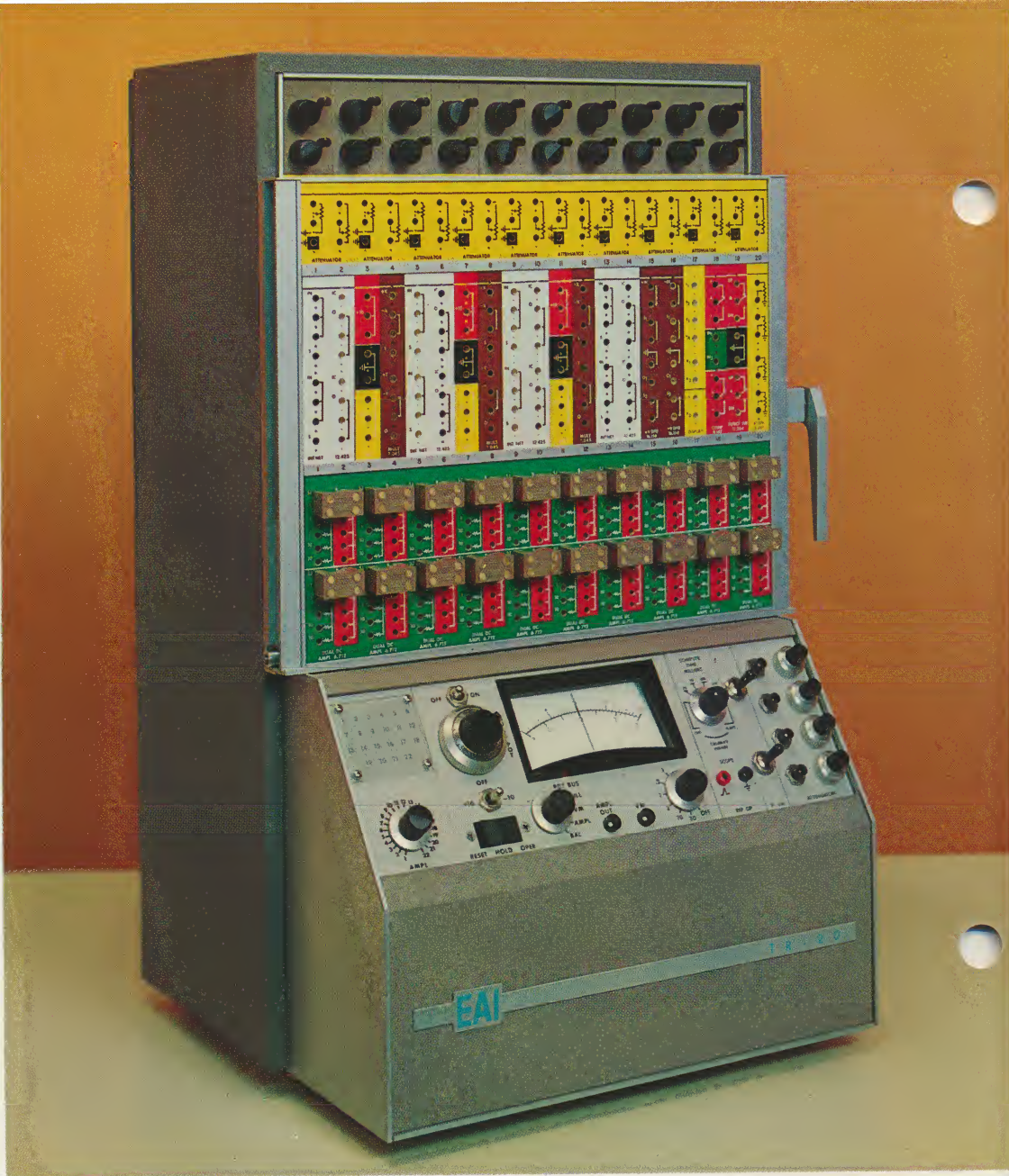
desk top analog computers . . . for the ultimate in high-speed, low-cost problem solving capabilities

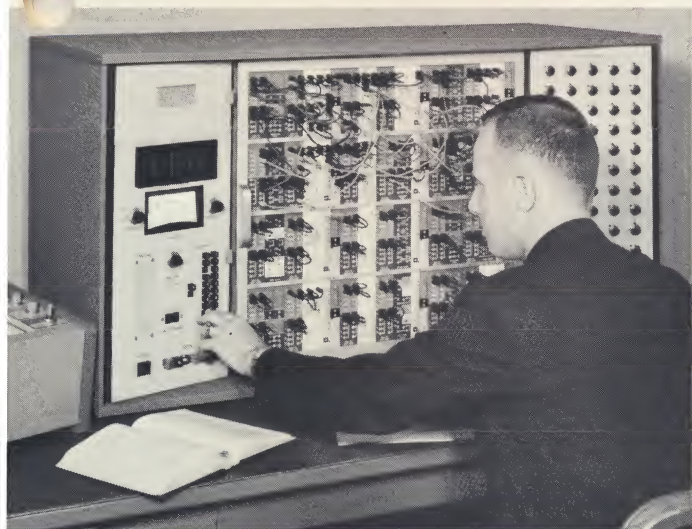# TR-48

EAI
PACE
TR-48

TR-20

TYPICAL APPLICATIONS

PACE® TR-48 Highlights

- **48 AMPLIFIER CAPACITY.**
- **WIDEST USABLE BANDWIDTH OF ANY DESK TOP COMPUTER.**
- **ITERATIVE SOLUTION AND MULTI-TIME SCALE CAPABILITY** —by individual control of integrators available on Patch Panel.
- **HIGH-SPEED REPETITIVE OPERATION CAPABILITY** — automatic time-scale change of 500 to 1 facilitates change from real time to HSRO.
- **4 INDEPENDENT TIME SCALE CHANGES** — 1:1, 10:1, 500:1, 5000:1 available by automatic switching of capacitors within integrators.
- **SOLID STATE READOUT** — push button controlled; digital voltmeter permits readout of potentiometers for rapid setting and check, plus readout of amplifiers and trunks.
- **REMOVABLE PATCH PANEL OFFERS ULTIMATE FLEXIBILITY** and ease of programming. Color-coded by function; Modular; Bottle plugs for 70% of patching; ALL necessary terminations brought to front panel for complete storage of problems (including mode control relays, additional X10 time scale changes, inputs, outputs, etc.).
- **COMPACT AND MOBILE, LOW POWER DRAIN** — sets on any desk and plugs into any 115/230V, 50-60 cps outlet. Power drain less than a 150 watt bulb.

The most complete desk-top analog computer available — solving sophisticated problems such as those requiring high-speed repetitive operation and iterative techniques with a capability equal to that of many console computing systems. The TR-48 is solid-state designed for long-life reliability — an expansion of the successful TR-10 computer, the first completely transistorized analog computer.

The TR-48 is available in any complexity, from a basic unit to simulate linear systems to a unit to provide the most complicated non-linear simulations

All computing components plug in from the front for simplified system set-up, regardless of complexity. TR-48 computers are readily "ganged" and "slaved" for even greater extension of system capabilities.

Typical applications of the TR-48 are: system optimization, boundary value problems, model building — including portions of the anatomy for bio-medical investigations, rapid determination of stability of control systems, approximate computation and display of integral transforms, statistical studies requiring many solutions, and a wide variety of routine computational problems requiring multiple solutions.

Every operational feature of the TR-48 is human-engineered to the maximum to simplify operational training and the actual programming. Your present engineering personnel can learn to operate and program it without elaborate training, and discover the multiple benefits in shortcutting time to solution of their most intriguing problems while cutting cost in the engineering of optimum products.

TYPICAL APPLICATIONS

AERO-SPACE

design of satellite stabilization system ■ system design on a canard aerodynamic control program ■ stability of V T O L aircraft ■ analysis of pointing servo stability ■ simulation of aperture of optical sensors ■ in-line computations on flight test data ■ study of effects of non-linearities in servo systems ■ calibration of operational aircraft systems

BIO-MEDICAL

radiation dose distribution ■ study of adrenal cortical steroid project ■ chemotherapy study ■ CO_2 Rebreathing study ■ Carotid sinus study ■ Simulation of human fetal system

CHEMICAL ENGINEERING

study of non-linearities in chemical reactors ■ simulation of dynamic response of heated vessels ■ limit of cycle studies ■ study of pulsation dampening in process hydraulic lines ■ simulation of temperature distribution in two dimensional systems ■ calculation, on continuous basis, of conversion of catalysts

FOOD TECHNOLOGY

study of fermentation kinetics

PACE® TR-20 Highlights
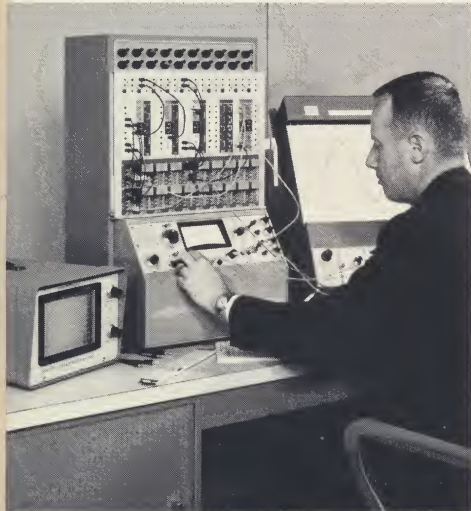
- ■ PORTABLE AND RUGGED TRANSISTORIZED DESIGN — 15" x 16" x 27", 102 lbs. fully expanded

- ■ UP TO 20 AMPLIFIERS — each programmable as a summer, integrator or high-gain amplifier for use with non-linear equipment.

- ■ WIDE SELECTION OF INTERCHANGEABLE, NON-LINEAR, SOLID-STATE COMPUTING COMPONENTS — including variable break point and variable slope diode-function generators, sine-cosine, X^2 and log function generators.

- ■ SIMPLE ADJUSTMENT OF VARIABLE DIODE-FUNCTION GENERATORS — slide-out drawers expose adjustments.

- ■ HIGH-SPEED REPETITIVE OPERATION DISPLAY — provides up to four visual displays of computer readouts simultaneously.

- ■ LOW POWER, GUARDED CIRCUITS — protect operator and computer. Draws less than 60-watt bulb. Operates from 115V, 60 cps outlet.

- ■ INCLINED CONTROL PANEL — for easy finger-tip control. EASY TO PROGRAM, LARGE, COLOR CODED PATCH PANEL.

The PACE TR-20, is an all-transistorized desk-top analog computer that puts proven high-speed computation at the engineer's finger-tips. Though compact in size it is a full fledged computer, capable of solving many complex problems previously requiring scheduling on large computing systems. It offers up to 20 amplifiers plus components for addition, subtraction, multiplication, division, integration and generation of powers, roots, logs, antilogs, sine, cosine and arbitrary functions — in one cabinet, and available to one patch panel.

The TR-20 is useful in solving problems in such diverse areas as servo-system design, heat flow, chemical reaction analyses, suspension systems studies and many other problems involving dynamic conditions.

With a TR-20 analog computer an engineer can explore problems as they occur with instantaneous visual readout — determining the feasibility of projects immediately — without leaving the desk. Simply turn a dial to feed in parameters, and the computer provides an instant, dynamic picture of the effect of each change. The endless drudgery of step-by-step calculation is eliminated —engineering data becomes alive.

MILITARY

solution of 5 degrees of freedom equations in submarine control problem ■ simulation of interior ballistics of a cartridge-actuated device

NUCLEAR

simulation of the primary loop of a nuclear power plant ■ poisonimetry studies
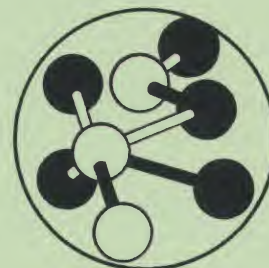
PETROLEUM

analysis of flow path of an oil globule ■ cross correlation of seismic traces

RESEARCH

determination of electro-osmosis in soil

TEXTILE

analysis of treating plant waste-disposal system

Analog Simulation . . .

Analog Simulation is a dynamic method of solving the problems that confront the engineer and scientist daily — and EAI TR-20 and TR-48 Analog Computers provide an unsurpassed capability for simulating systems of all types. Analog computers help slash project costs by saving time and cost of materials in trial and error testing of prototypes or pilot plants. One engineer with a desk-top PACE® computer can be the equal of several men limited to conventional design tools; moreover, he can gain a unique insight of the dynamic performance of systems to produce a superior product.

Experimentation time and costs are similarly slashed. Ideas that were once too costly or time consuming to be tried can be "debugged" right on the computer. **Analog computation actually stimulates creativity.**

Pace TR-20 and TR-48 Computers provide . . . .

- **High dynamic accuracy over the widest range of frequencies available in a desk-top computer.**

- **Excellent combination of real-time solutions and high-speed repetitive** operation. Change from real-time to HSRO (500:1 time-scale change) is accomplished without program patching changes. Units offer fastest repetitive cycling rate available in desk-top computers.

- **Fully transistorized design is field-proven** (over 600 units in the field) for: Extremely high reliability ■ Ruggedness ■ Compactness ■ Low drift — non-heating components ■ Cool operation — no need for air-conditioning ■ Insensitive to ambient temperature (35 to 120° F) ■ Low power — plugs into any wall socket.

- **Complete line of computing components** compatible with high-speed amplifier and best dynamic accuracy of any desk-top computer.

- **Ultimate in progamming ease and problem control developed over years** of engineering experience on larger analog computers. Large, removable, color-coded, easy-to-use pre-patch programming panels.

- **Versatility** with interchangeable plug-in transistorized computing components.

- **Parameter changes dialed in** — simply change potentiometer settings, output changes are instantaneous.

- **Central visual overload alarm.**

- **Amplifier resistor networks matched** to .01%.

- **Free instruction course** with every purchase of TR-20 or TR-48 Analog Computer.

PACE® TR-20 TR-48

analog computers are backed by the unmatched experience of

EAI

EAI HYDAC 2400 — a powerful new tool for scientific computation . . . a completely integrated hybrid computing system to provide solutions to problems beyond the scope of separately operated analog or digital computers.

EAI maintains fully equipped and expertly staffed computation centers in key areas throughout the world for customer training in the latest computation techniques. Shown above is the computation center in Princeton, New Jersey. Others are in San Francisco, California; Los Angeles, California; Burgess Hill, Sussex, England; Brussels, Belgium.

EAI®

ELECTRONIC ASSOCIATES, INC. *Long Branch, New Jersey*

ADVANCED SYSTEMS ANALYSIS AND COMPUTATION SERVICES/ANALOG COMPUTERS/HYBRID ANALOG-DIGITAL COMPUTATION EQUIPMENT/SIMULATION SYSTEMS/ SCIENTIFIC AND LABORATORY INSTRUMENTS/INDUSTRIAL PROCESS CONTROL SYSTEMS/PHOTOGRAMMETRIC EQUIPMENT/RANGE INSTRUMENTATION SYSTEMS/TEST AND CHECK-OUT SYSTEMS/MILITARY AND INDUSTRIAL RESEARCH AND DEVELOPMENT SERVICES/FIELD ENGINEERING AND EQUIPMENT MAINTENANCE SERVICES.